corrosion and chemical degradation for prolonged sensing and actuation applications of the said novel ionic polymer metal composite material which generates an electrical signal with mechanical deformation and undergoes mechanical deformation if an electric field is imposed on it.

1. **(AMENDED)** Novel ionic polymer metal composites are claimed. The said composites are manufactured by means of an innovative chemical depositing process, the process comprising the steps of: first depositing non-noble metal salt cations inside a cationic ionic polymer molecular network followed by chemical reduction of the said non-noble metal salt cations to generate reduced non-noble metal particles deposited inside the polymeric molecular network and outside surfaces of the polymeric material, followed by a second electro or chemo deposition and plating of a noble metal inside and on surfaces of the said reduced non-noble metal particles in the said polymer molecular network to protect the first said non-noble metal particles from oxidation, corrosion and chemical degradation for prolonged sensing and actuation applications of the said novel ionic polymer metal composite material.

2. **(ORIGINAL)** The manufacturing processes for the novel ionic polymer metal composite material of claim 1, further comprising the steps of: first depositing none noble metal salt cations inside a cationic polymer molecular network and the outside surfaces of the polymeric material, like outside metallic electrodes, followed by chemical reduction of the said none noble metal salt cations to generate reduced none noble metal particles deposited inside the polymeric network, followed by a second electro or chemo deposition and plating of a noble metal inside and on surface of the said reduced none noble metal particles in the said polymer molecular network to protect the first said none noble metal particles from oxidation, corrosion and chemical degradation for prolonged sensing and actuation applications of the said novel ionic polymer metal composite material which generates an electrical signal with mechanical deformation and undergoes mechanical deformation if an electric field is imposed on it.

2. **(AMENDED)** Novel manufacturing processes for the composites claimed in claim 1 are claimed. The said manufacturing processes for the novel ionic polymer metal composite material of claim 1, further comprising the steps of: first depositing non-noble metal salt cations inside a cationic polymer molecular network and outside surfaces of the polymeric material, followed by chemical reduction of the said non-noble metal salt cations to generate reduced non-noble metal particles deposited inside the polymeric network, followed by a second electro or chemo deposition and plating of a noble metal inside and on the surface of the said reduced non-noble metal particles in the said polymer molecular network to protect the first said non-noble metal particles from oxidation, corrosion and chemical degradation for prolonged sensing and actuation applications of the said novel ionic polymer metal composite material.

3. **(ORIGINAL, WITHDRAWN)** The manufacturing processes for the novel ionic polymer metal composite material of claim 1, as described in claims 1 and 2 further comprising the steps of: adding dispersing chemicals to the said chemical reduction process, wherein said addition of a dispersing agent prevents reduced noble and none

noble metal particles to coalesce and helps forming uniformly distributed none noble metal particles chemically deposited inside the ionic polymer network and further helps them to penetrate deeper into the said ionic polymer molecular network.

4. **(ORIGINAL, WITHDRAWN)** The manufacturing processes for the novel ionic polymer metal composite material of claim 1, as further described in claim 2 further comprising the steps of: adding an alcohol solvent to the reduction solution, wherein said addition of an alcohol solvent such as isopropyl alcohol and/or ethyl alcohol, helps expand the ionic polymer network and enhances deeper penetration of noble and none noble metal particles into said ionic polymer molecular network.

5. **(ORIGINAL, WITHDRAWN)** The manufacturing processes for the novel ionic polymer metal composite material of claim 1, as further described in claim 2 further comprising the steps of: mechanically stretching the said ionic polymer before the start of manufacturing processes described in claims 1, 2, 3 and 4, wherein said mechanical stretching helps expand the ionic polymer network and enhances deeper penetration of noble and none noble metal particles into said ionic polymer molecular network.

6. **(ORIGINAL)** The novel ionic polymer metal composite of claim 1 to be used as electromechanical sensors in the sense that if they are mechanically moved or deformed they generate an electrical voltage across their surface electrodes. Typical values are that for a cantilever sample of such active materials of dimensions 20 mmx5 mmx0.2 mm flipped at one end by 10 mm, generates up to 10 mV across its surface electrodes.

6. **(AMENDED)** The sensing property of novel ionic polymer metal composite of claim 1 when used as electromechanical sensors. It is further claimed that the said novel ionic polymer composites will generate an electrical voltage across their surface electrodes if they are mechanically moved or deformed.

7. **(ORIGINAL)** The novel ionic polymer metal composite of claim 1 to be used as electromechanical actuators, transducers and artificial muscles in the sense that if they are electrically activated by placing an electric field across their surface electrodes of the said cantilever sample in claim 6 as a bending actuator, they move or bend or flip dynamically like a wing with time varying electric fields. Typical values are that a cantilever sample of such active materials of dimensions 20 mmx5 mmx0.2 mm placed in an electric field of 5 mV/μm, generates a bending deflection of about 10 mm at its free end.

7. **(AMENDED)** The actuation property of novel ionic polymer metal composite of claim 1 to be used as electromechanical actuators, transducers and artificial muscles. It is further claimed that the said novel ionic polymer composites will move or bend or flip dynamically like a wing if placed in a time varying electric field imposed across their surface electrodes.